Veolia Comments on the Statement of Basis
Reference to Previous Site-Specific Dispersion Modeling and Risk Assessment

Technical Evaluation
Developed by:
Delana W. Owen[1], Franklin Engineering Group, Inc.

US EPA Region V cites to the May, 2007 US EPA report titled, "Risk Screening and Risk Management Recommendations for Veolia ES Technical Solutions, L.L.C., Sauget, Illinois", attached hereto as Attachment 1, and the Addendum thereto dated November 2007, attached hereto as Attachment 2 (collectively "Report"), as support for the proposed reopening of the Veolia Title V permits and proposed revisions contained therein (from Statement of Basis, pg. 28, footnote 40). The Report presented results of risk screening conducted by US EPA Region 5 to address comments raised as part of the public participation process related to the 2003 proposed Title V Permit renewal of the Veolia ES Technical Solutions, L.L.C. ("Veolia") hazardous waste incineration facility located in Sauget, Illinois. The Report includes calculations based on assumed theoretical, rather than actual, sampling and analysis of water and fish from Frank Holten State Park and the hypothetical consumption of fish by residents in the area. US EPA refers to the Report as a risk screening because only specific pollutants believed to have a likelihood to exceed accepted levels of cancer risk or chronic toxicity in previous risk assessments for hazardous waste combustors were evaluated. Additionally, the Report was considered screening because a number of simplifying conservative assumptions were made in the process of conducting the assessment.

Due to errors, unsubstantiated assumptions and the failure of US EPA to resolve conflicting information, the Report is technically inaccurate for the Sauget facility. The Report only addresses facility risk and hazard superficially, rather than deriving a conclusion from a fair evaluation of reasonable assumptions and data. It is inappropriate and not in keeping with regulatory guidance to set permit limits based on a superficial risk screening, particularly when site-specific values are readily available. The US EPA Guidance that applies to Risk Assessments for Hazardous Waste Combustion Facilities (EPA 530-R-05-006, September 2005, Page 1-9) provides the following advice to permittees, "We encourage you to use existing and

[1] Please see curriculum vitae Attachment 9.

site-specific information throughout the risk assessment process in order to properly evaluate actual regulated operations for any particular combustor. We generally recommend conservative default assumptions only when they will provide confidence that ensuing permit limits will behealth protective."... "Throughout the HHRAP we offer parameter values for you to consider. These values are based on a number of elements, such as the best science available and professional judgment. Since this is a national level guidance, the recommended values typically reflect national average conditions. The values will be more appropriate for some sites, and less so for others. For example, the type of waterbody near a facility (i.e. lake, river, wetland) may affect the methylation rate of mercury in the waterbody, or the type of fish consumed may affect percent lipid content used in the assessment. So, a value that is reasonable for one facility may be over (or under) protective at a different facility." Guidance goes on to state, "You should generally make every effort to reduce limitations and uncertainties in the risk assessment process, since they can affect the confidence in the risk assessment results."

US EPA Region 5 performed a risk screening using overly-conservative and inaccurate assumptions that were neither investigated nor verified for applicability and appropriateness. Veolia provided additional information to US EPA so that site-specific values could be utilized in the evaluation of risk and hazard, but US EPA Region 5 refused to consider the information provided and chose to rely on default parameters that had no basis for the site in question.

Specific issues that are fatal to the Report's conclusions include:

1. The Report does not take into account that the Frank Holten Lakes are not a closed system. The government admits in a private e-mail which Veolia makes a part of the public record through this affidavit that Frank Holten Lakes are connected via drainage canals to the Mississippi River and to each other. These connections allow a constant exchange of fish between the River and lakes. The purpose of the Report is to evaluate whether Veolia's emissions are potentially adversely affecting the fish and humans consuming the fish from Frank Holten Lakes, and yet, it fails to recognize or account for whether the fish being studied spent any substantial time in the lakes.
2. The Report assumes that all fish in the Frank Holten Lakes are subjected to potential contaminants from Veolia emissions during their entire life cycle. In fact, US EPA Region 5 is aware or should be aware that channel catfish and other fish likely to be the focus of the public's fishing efforts are routinely stocked in Frank Holten Lakes at catchable size and that many fish caught from Frank Holten Lakes are caught shortly after stocking.
3. The Report specifies a default trophic level for fish caught from the Frank Holten Lakes of 4.0, which is the highest and most conservative value that is recommended for risk

assessment. In a private e-mail which Veolia makes a part of the public record through this affidavit, Illinois EPA has provided information that a more appropriate trophic level for the Frank Holten Lakes is 3.5. The actual site-specific trophic level of fish harvested may be lower than either of these values.

4. The Report makes contradictory assumptions that background concentrations of mercury in Frank Holten Lakes are both zero and high enough to be contributory to increased concentrations overall. Both assumptions cannot exist simultaneously.
5. The Report inaccurately assumes high fish consumption rates from Frank Holten Lakes. The Report specifies a consumption rate based on the alleged presence of subsistence fishers in the nearby area, who allegedly consume fish from the Frank Holten Lakes on a daily basis. The Report assumes this level of consumption without attempting to verify it in a scientific fashion and without considering the overwhelming evidence to the contrary. Harvesting of fish from the Frank Holten Lakes is guided by notices at the lakes that restrict the quantity of fish removed based on PCB levels in the lakes. It should be noted that PCBs have never been handled by Veolia's Sauget, Illinois facility. Therefore, the presence of PCBs in the fish which caused the government to post the consumption limitations are counter indicative of subsistence level consumption and independent of Veolia. Further, the lakes do not contain a sustainable fish population that would support subsistence consumption. The Report fails to consider these facts in reaching its conclusions and fails to consider Franklin Engineering's objections to the inaccurate consumption rates (see below).

Veolia contracted Franklin Engineering Group, Inc. (Franklin) to perform an independent Human Health Risk Screening Assessment using the same regulatory guidance and methodology as the US EPA Region 5 Risk Screening, but also using available site-specific information related to the issues discussed previously. Franklin's Human Health Risk Screening Assessment demonstrated that Veolia operations did not pose significant health effects at the current regulatory limits for the hazardous waste incinerator. The Human Health Risk Assessment Report (Final Version provided as Attachment 3 to this document) was published in September 2004, and revised in May and October 2005..

Risk screening methods are only valuable if they are based on accurate information and reasonable assumptions. The Report failed in this regard. Risk assessments, such as that conducted by Veolia, are more compelling than risk screenings because they utilize site-specific information to more closely approximate health impacts. Each of the five issues presented are discussed in depth in the following sections. Attachments are provided to substantiate the information provided and to document communication with both US EPA Region 5 and IL EPA.

1. <u>The Report purports to evaluate water and fish that move freely between the Mississippi River and the Frank Holten Lakes without attempting to account for this variable.</u>

Mr. Dan Stephenson of Illinois Department of Natural Resources stated in an October 2011 email (provided as Attachment 7) that "the lakes at Frank Holton are connected via ditches to the Mississippi River allowing a constant exchange of multiple species between lake and river. This is not a static system. There could be a claim that the fish tested originally came from the river and pick up the methyl mercury elsewhere."

Certainly, there is carryover of fish species and any pollutants between the lakes themselves and between the lakes and water bodies that are connected to the lakes. The INHS Post-Restoration Monitoring Report (provided as Attachment 6) documented flow between the lakes and between the lakes and other water sources. "For Lakes 1 and 2, the types of unaccountable flows are limited. Interlake transfers can be either inflows from Lake 3 or outflows to Lake 3. These flow rates, which are generally low due to the limited interconnecting channel capacity, can be significant over long periods of time. A one-directional flow of as little as 1 cubic foot per second (cfs) can result in a monthly inflow of more than 50 acre-feet."

"In addition to the interlake transfers and ground-water flows discussed for Lakes 1 and 2, there are replacement inflows from Harding Ditch to restore evaporation and infiltration losses. These replacement flows are not available to the upper lakes following their summer drop in level. The connection of Lake 3 to Harding Ditch is continuous, and these "slow" losses can be made up." Lake Management Status Reports also document the transfer of fish species from connecting water bodies, as stated in the April 3, 2003 report (Attachment 8) "The lake also floods through ditches connected to the Mississippi River. This connection introduces many undesirable species including common carp, buffalo, grass carp, bighead carp, gizzard shad, yellow bass, and bullheads."

It is clear that any pollutants entering Frank Holten Lakes would be affected by inflow and outflow with other sources. Likewise, the assumption that only fish that begin their life cycle in the lakes are harvested is inaccurate. Therefore, modeling the lakes as a closed system is inaccurate and inappropriate.

2. <u>The Report fails to consider the effect of fish stocking on assumed mercury concentrations in fish from Frank Holten Lakes, thus also invalidating the Report.</u>

Both of the Frank Holten lakes are regularly stocked with catchable size fish from the state hatcheries. Main Lake is generally stocked with an annual total of over 10,000 catchable size fish, including Rainbow Trout, Channel Catfish, and Largemouth Bass. Lake #3 is also stocked with thousands of catchable size fish annually, including Channel Catfish and Largemouth Bass. These species of fish represent three of the five most prevalent species of fish harvested in the State of Illinois. Attachment 5 presents fish stocking records from 2006 through 2011 provided by Mr. Fred Cronin, Illinois DNR Fisheries Biologist.

The Report did not consider the effect of such stocking. Fish stocked later in their development or at catchable size are less affected by lake contaminants since they are not exposed to contaminants during their entire life cycle, most notably, during earlier stages when increased uptake of contaminants is accomplished. Consequently, incremental risk to fishers is reduced due to the practice of annual stocking of these lakes.

3. **<u>The Report used a trophic level that was too high and not supported by the available evidence, thus overstating assumed mercury uptake in fish.</u>**

Risk Assessment modeling estimates exposure to mercury through fish consumption by calculating the degree at which mercury concentrates in the fatty tissues of fish when exposed to the pollutant in the water column. A bioaccumulation factor (BAF) is specified by guidance that is defined as the ratio of methylmercury concentration in fish flesh divided by the concentration of dissolved methylmercury in the water column. Bioaccumulation factors are typically related to trophic level with trophic level 4 being specified as the default value in the absence of site-specific information. This highest trophic level corresponds to a higher BAF, since larger species are assumed to have been exposed to any potential contamination for longer and also to be higher level food chain representatives.

Based on review of available data, the maximum trophic level of 4.0 is not representative of fish caught at Frank Holten Lakes. Further, information from IEPA and US EPA Region 5 has been contradictory and unsubstantiated with respect to this parameter. For example, US EPA Region 5 stated in their Addendum 1 - Risk Screening for the facility (Attachment 2) that "The available information indicates that the lakes at Frank Holten State Park contain fish at a trophic level 4." Meanwhile, Mr. Ted Dragovich from IEPA stated in his August 15, 2011 email (Attachment 4) that "USEPA adjusted the trophic level down from 4 to 3.5 for the last risk assessment".

Fishing reports supplied by Mr. Fred Cronin from 2001 – 2004 indicate that largemouth bass, which are the only Trophic Level 4 fish documented at Frank Holten Lakes are largely present due to stocking practices. The Lake Management Status Report from 2003 (Attachment 8) states "Maintaining a decent sport fishery in this lake is challenging. The physical habitat of the lake is quite poor. The lake is shallow and turbid with no aquatic plants and little structure. The lake also floods through ditches connected to the Mississippi River. This connection introduces many undesirable species including common carp, buffalo, grass carp, bighead carp, gizzard shad, yellow bass, and bullheads. These species compete directly and indirectly for the available space and resources of the lake.... However the continued stocking of rainbow trout, channel catfish, and largemouth bass can provide some quality angling opportunities at this lake."

Due to the stocking practices, trophic level 3.5 and 4.0 are likely both inappropriate to represent contaminated fish that are routinely caught from the Frank Holten Lakes, In any case, the Report's failure to address or even mention the effect of stocking on the trophic levels of the fish demonstrates the Report's failure to accurately represent and portray the conditions in the lakes and the anticipated mercury levels, if any, in the fish.

4. <u>The Report arbitrarily assumes two conditions that cannot exist simultaneously - both background concentrations of mercury and no mercury in Frank Holten Lakes.</u>

The Report assumed *both* background levels of mercury and no background levels of mercury in the water column. Each condition is exclusive of the other – they cannot both be simultaneously true.

One of the assumptions made by US EPA Region 5 is that background levels of mercury in the Frank Holten Lakes require a more stringent benchmark for comparison to risk assessment results because of the likelihood of increased background levels. US EPA's Risk Screening states, "...risk management decisions which follow U.S. EPA recommendations" ..."typically consider the potential for cumulative emissions indirectly by: (1) assuming that other nearby sources of similar toxic metals contribute up to three times the amount of the facility being evaluated; ..." This conservative approximation is the basis for regulatory guidance such as the following excerpt from the Region 6 Risk Management Addendum (EPA-R6-98-002, July 1998), which indicates that background concentrations are assumed to account for a significant fraction of exposure:

> ... for the purposes of RCRA permitting decisions and consistent with U.S. EPA (1994c), U.S. EPA Region 6 recommends a modified target hazard level, to account for background contributions, from an *HQ* or *HI* target value of 1.0 to a target value of 0.25. This modification eliminates the need to collect background COPC concentration data before completing the risk assessment, by assuming that COPC emissions from hazardous waste emission units result in incremental increases of existing background COPC concentrations, which are, by default, assigned an *HI* or *HQ* value of 0.75. Although background COPC *HQ* or *HI* values might not equal 0.75, as a result of this modified target level, either the *HQ* (for a single COPC) or the *HI* (for multiple COPCs

or pathways) resulting from combustion unit emissions should be less than 0.25. An *HQ* or *HI* equal to or exceeding 0.25 indicates a potential for noncarcinogenic health effects. However, an *HQ* or *HI* equal to or exceeding 0.25, rather than necessarily indicating that noncarcinogenic health effects can or will occur, indicates only that there is a potential for noncarcinogenic effects, based on a specific set of exposure, model, and toxicity assumptions."

Although setting a benchmark at 25% of the target hazard level is a conservative approximation that can be assumed in the absence of site-specific data, the determination of actual background levels allows the development of more accurate risk assessment parameters and comparison to the more appropriate benchmark. Therefore, Veolia proposed the collection of water samples from the Frank Holten Lakes to eliminate the need for this overly conservative approximation, as well as to more closely model mercury concentrations in the lakes.

In response to Veolia's proposal, IEPA responded that it was unnecessary to attempt to quantify mercury concentrations in the water column because those values were already assumed to be zero. See Attachment 4 email from Ted Dragovich, IEPA dated August 15, 2011.

The regulators are simply not evenhanded. When they attempt to justify reducing Veolia's emissions, they claim that the lakes and fish are already burdened by mercury and therefore justify a stringent approach when evaluating Veolia's emissions against this assumed already burdened background. However, when Veolia proposed to actually test the lakes to verify mercury concentrations, the response was that the initial fish, water and sediment samples have no mercury.

5. <u>The Report inaccurately assumes high fish consumption rates.</u>

There is no scientifically valid documented evidence of subsistence fishing in the area of Sauget, Illinois or Frank Holten Lakes. Nevertheless, the Report utilizes a consumption rate that represents subsistence fishers in the calculations performed. This unjustified assumption grossly overestimates risk.

Veolia determined in its risk assessment that at most there was a potential for the presence of recreational fishing at Frank Holten Lakes. This determination was based on discussions with Mr. Fred Cronin, in January 2005. Although harvesting records were not available for more recent years, Mr. Cronin discussed the function of the park and its lakes as recreational. He advised that fishing at these lakes has changed from "a source of protein to recreational activity." He indicated that future creel surveys (which are interviews with anglers at targeted locations to gain information about the effort, harvest, size distribution of fish species, etc.) would likely indicate much greater catch and release activity than had been present in the past.

Further, creel studies performed at Frank Holten Lakes support the determination that fishing conditions are poor and unlikely to support heavy consumption of any species. A creel survey was conducted on the lakes after a reconstruction project performed to enhance recreational use of the area in the early 1990's by the INHS under Federal Aid Project F-69-R. The 1994 report describing the project and results (Attachment 7 to this document) stated, "For the most part, the results of the creel survey were about what would be expected from an urban lake. But exceptions were found in angling pressure and boat fishing versus shore fishing. The total of 248 hours/acre (hrs/ac) fishing pressure measured is low compared to 666 hrs/ac at Beaver Dam and 850 hrs/ac at Siloam Springs. Further, shore fishing accounted for 80 percent of the fishing effort and boats accounted for only 20 percent. Normally, one would expect a 60-40 split the other way. The angler using FHSP Lakes traveled an average 4.6 miles to fish, and the overall rating of the lake by the anglers on a scale of 1 - 10 was 2.7, indicating much dissatisfaction with the fishing." This information and the conversations with Mr. Cronin in 2005 reflect that the lakes have not been a very productive source of protein for over a decade and even recreational fishing in the lakes is dissatisfying due to poor catches.

The same study went on to say that, "As an example, largemouth bass, the main predator stocked in these lakes, were caught at only 4.8 pounds/ac, but one would expect the catch rate to be about 20 pounds/ac. Further, it appears that the anglers are keeping most of what they catch, as the difference between catch and harvest is not great. The average size of fish harvested was small. Yellow bass, for instance, were less than 0.1 pound on the average. It is difficult to envision anyone being able to catch a fish that small."

"In summary, the catch results reflect the angler rating of the lake. Anglers were catching low numbers of fish that, for the most part, were smaller than expected or desired. This is probably due to lack of macrophytes, significant reduction in fish habitat during the summer stratification period, poor quality and quantity of benthos, overharvest, and/or possibly because most of the fishing was from the bank, limiting anglers to a relatively small proportion of the lake."

The Report should not have included a consumption rate based on subsistence fishing because, based on modern evidence, subsistence fishing does not take place in the area. Further, given the proximity of other large bodies of water, including the Mississippi River and Horseshoe Lake State Park, even if there were subsistence fishers in the local area – and there is no evidence that such fishers exist in the area - they would be unlikely to fish solely at Frank Holten State Park. The most reasonable and likely scenario is that the recreational fisher and recreational fisher child exposure scenario should have been used because, as the evidence demonstrates, the Frank Holten Lakes may be lightly fished for recreational purposes. Therefore, the use of the recreational fisher and fisher child exposure scenarios more closely approximate the potential for risk than that of the subsistence fisher and fisher child. As Veolia demonstrated in it risk assessment, when the recreational scenario is utilized, no increased risk is found.

Prepared By: Delana W. Owen
Franklin Engineering Group, Inc.

Signature: ______________________

Date: 3-14-13

State of Tennessee
County of Davidson

SWORN AND SUBSCRIBED
Before me this 14 day of March, 2013.

Notary Public

My Commission Expires:

03 November 2015

DAVID FAUSTINO SANDOVAL
STATE OF TENNESSEE NOTARY PUBLIC
DAVIDSON COUNTY

References

Risk Screening and Risk Management Recommendations for: Veolia ES Technical Solutions, L.L.C. Sauget, Illinois (Formerly: "Onyx Environmental Services") / Document 174 / United States Environmental Protection Agency Region 5/ Christopher Lambesis et.al. / May 2007

Addendum 1 - Risk Screening and Risk Management Recommendations for:Veolia ES Technical Solutions, L.L.C., Sauget, Illinois - Explanation of Mercury Speciation, Dispersion and Methylation / Document 177 / United States Environmental Protection Agency Region 5/ Christopher Lambesis et.al. / November 2007

Onyx Environmental Services Rotary Kiln and Fixed Hearth Incinerators Screening Level Human Health Risk Assessment Report / Franklin Engineering Group, Inc. / Franklin, TN / Rev. October 2005

Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA530-R-05-006, U.S. Environmental Protection Agency, Washington, D.C.

Region 6 Risk Management Addendum – Draft Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA-R6-98-002, U.S. Environmental Protection Agency, Washington, D.C.

External Email correspondence from Ted Dragovich, IEPA / August 15, 2011

Frank Holten Park Fish Stocking Records, provided by Mr. Fred A. Cronin, District 16 Fisheries Biologist, Granite City, IL / October 2011

External Email correspondence from Mr. Dan Stephenson, Illinois Department of Natural Resources / October 2011

Frank Holten State Park Lakes: Phase III, Post-Restoration Monitoring by Raman K. Raman and William C. Bogner / Offices of Water Quality Management and Hydraulics & River Mechanics / Prepared for the Illinois Environmental Protection Agency / December 1994

Lake Management Status Report: Frank Holten State Park Main Lake / Fisheries Manager: Fred Cronin / April 2003

ATTACHMENT 1

Risk Screening and Risk Management Recommendations for:
Veolia ES Technical Solutions, L.L.C.

Document 174

Letters/Re: Risk Screening and Risk Management Recommendations for Veolia ES Technical Solutions, LLC, Sauget, Illinois, dated May 2007

Fed 24334

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

May 10, 2007

VIA FEDERAL EXPRESS

Mary Riegle
Illinois Environmental Protection Agency
Permits Section
1021 North Grand Avenue East
#33
Springfield, Illinois 62794-9276

Dear Ms. Riegle:

Enclosed please find the "Risk Screening and Risk Management Recommendations for: Veolia ES Technical Solutions, L.L.C., Sauget, Illinois," dated May 2007. Please feel free to contact me at (312) 886-2967 if you have any questions or concerns. Thank you.

Sincerely,

James Blough
Environmental Scientist

cc: File

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Risk Screening and Risk Management Recommendations for: Veolia ES Technical Solutions, L.L.C. Sauget, Illinois (Formerly: "Onyx Environmental Services")

May 2007

Prepared By:

Christopher Lambesis, Environmental Scientist
Todd Ramaly, Environmental Scientist
Mario Mangino, Toxicologist
James Blough, Environmental Scientist

U.S. EPA - Region 5
Waste, Pesticides and Toxics Division
Waste Management Branch
77 W. Jackson Boulevard
Chicago, Illinois 60604

Risk Screening and Risk Management Recommendations for:
Veolia ES Technical Solutions, L.L.C.
Sauget, Illinois

I. Background

A. Introduction

This report presents the results of an updated risk screening conducted as part of an evaluation of the Veolia ES Technical Solutions, L.L.C. ("Veolia") hazardous waste incineration facility located in Sauget, Illinois. This evaluation has been conducted to provide additional information relevant to a proposed permit renewal decision by the State of Illinois.

The original version of this screening was issued in draft as part of the public participation process related to the permit renewal proposed by the Illinois EPA in 2003. The original risk screening document was later revised and dated September 23, 2003.

This revised version of the risk screening was developed in response to various public concerns that were raised during the 2003 public comment period.

In this document, the analysis is referred to as a risk screening because the focus is only on those pollutants which the U.S. EPA believes to have a likelihood of exceeding accepted levels of cancer risk or chronic toxicity at this time, based on the U.S. EPA's experience with previous risk assessments for hazardous waste combustors. It also is a screening in the sense that several simplifying conservative (protective) assumptions have been made in the process of conducting the assessment.

At this time, U.S. EPA Region 5 has focused specifically on the potential health impacts of chemicals and circumstances that were: (a) identified by citizens during the public comment period as potential problems, but not included in a previous screening (i.e., already existing background lead levels and effects from mercury on subsistence fishers at Frank Holten State Park); or (b) related to emission limits established by the Hazardous Waste Combustion - Maximum Achievable Control Technology Rule ("HWC-MACT" Rule). The chemical emissions assessed are polychlorinated dibenzodioxins and polychlorinated dibenzofurans ("Dioxins") and those toxic/carcinogenic metals which are regulated under U.S. EPA regulations at 40 CFR Part 63 Subpart EEE (i.e., HWC-MACT Rule).

B. The HWC-MACT Rule

Hazardous waste incinerators, such as the Veolia facility in Sauget, Illinois, are regulated under the Resource Conservation and Recovery Act (RCRA), which establishes a "cradle-to-grave" regulatory structure overseeing the safe treatment, storage, and disposal of hazardous waste. U.S. EPA issued RCRA rules to control air emissions from hazardous waste burning incinerators in 1981, 40 CFR Parts 264 and 265, Subpart O. These rules rely generally on risk-based standards to assure control necessary to protect human health and the environment, the applicable RCRA standard. See RCRA section 3004 (a) and (q).

Hazardous waste incinerators also are subject to standards under the Clean Air Act (CAA). U.S. EPA promulgated the HWC-MACT Rule on September 30, 1999 (64 FR 52828). As a result of legal challenges, U.S. EPA published interim standards for the HWC-MACT Rule on February 13, 2002 (67 FR 6792). On October 15, 2005, U.S. EPA finalized replacement standards and made other additions and amendments to the HWC-MACT Rule (70 FR 59402). The HWC-MACT Rule created a technology-based national cap for hazardous air pollutant emissions from the combustion of hazardous waste at incinerators. The rule regulates emissions of numerous hazardous air pollutants: dioxin/furans, other toxic organics (through surrogates), mercury, other toxic metals (both directly and through a surrogate), and hydrogen chloride and chlorine gas. For existing owners of hazardous waste incinerators, the RCRA Subpart O regulations generally no longer apply once the facility demonstrates compliance with the HWC-MACT Rule. [40 C.F.R. § 264.340(b)]

Although the HWC-MACT Rule standards provide a high level of protection (i.e., they are generally protective) to human health and the environment, thereby allowing U.S. EPA to nationally defer the RCRA emission requirements to MACT standards, additional controls may be necessary on an individual source basis to ensure that adequate protection is achieved in accordance with RCRA. Section 3005(c)(3) of RCRA provides the authority to impose additional conditions on a source-by-source basis in a RCRA permit if necessary to protect human health and the environment. Where site-specific factors beyond the HWC-MACT Rule standards are present, U.S. EPA may decide to conduct a site-specific risk assessment (SSRA). Some examples of site-specific factors include a source's proximity to a water body or endangered species habitat, repeated occurrences of contaminant advisories for nearby water bodies, the number of hazardous air pollutant emission sources within a facility and the surrounding community, whether or not the waste feed to the combustor is made up of persistent, bioaccumulative or toxic contaminants, and sensitive receptors with potentially significantly different exposure pathways (70 FR 59595). In addition, there are several uncertainties inherent in the 1999 national risk assessment for the HWC-MACT Rule. Thus, uncertainties related to the fate and transport of mercury in the environment and the biological significance of mercury exposures in fish (i.e., once mercury has been transformed into methyl mercury, it can be ingested by the lower trophic level organisms where it can bioaccumulate in fish tissue), as well as the risk posed by non-dioxin products of incomplete combustion, remain and may influence a decision to conduct an SSRA.

C. Summary of Site-Specific Factors Relevant to the Potential Risk from the Veolia Facility

U.S. EPA considered a number of site-specific factors in evaluating whether compliance with the standards of 40 CFR Part 63, subpart EEE alone at the Veolia facility would be protective of human health.[1] The following is a summary of those factors:

- Particular site-specific considerations such as proximity to receptors: (such as schools, hospitals, nursing homes, day care centers, parks, community activity centers, or other potentially sensitive receptors), unique dispersion patterns, etc.

Frank Holten State Park is approximately six kilometers from the Veolia facility incinerator stacks. The park has two lakes - Whispering Willow Lake and Grand Marais Lake - with a combined water surface of approximately 150 acres and five miles of shoreline. A fish advisory for polychlorinated biphenyl (PCB) contamination has been in effect for the Frank Holten State Park lakes. In addition, these lakes are subject to the Illinois statewide fish advisory for methyl mercury contamination. In addition to recreational uses of the park, U.S. EPA has received reports of subsistence fishing there.

- The identities and quantities of emissions of persistent, bioaccumulative or toxic pollutants considering enforceable controls in place to limit those pollutants;

The Veolia facility potentially emits, among other pollutants, dioxin, a known human carcinogen, and toxic and carcinogenic metals, including arsenic, beryllium, chromium, lead, cadmium, and mercury. Emissions of these pollutants are limited under the HWC-MACT Rule. This risk screening assesses the protectiveness of the corresponding HWC-MACT Rule emission standards for the Veolia facility.

- The identities and quantities of other off-site sources of pollutants in proximity of the facility that significantly influence interpretation of a facility-specific risk assessment;

U.S. EPA considered the presence of elevated levels of lead in the communities surrounding the Veolia facility in assessing the incremental added risk that could be posed by the emission of lead from the Veolia facility at the HWC-MACT Rule emission standard.

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[1] Although the focus of this risk screening is on human health, the presence of significant ecological considerations, such as the proximity of a particularly sensitive ecological area, may also be an appropriate factor to consider. In November 2006, the United States Fish and Wildlife Service (U.S. FWS) identified the following list of threatened or endangered species that may be present within the area five miles around the Veolia facility: the endangered Indiana bat (*Myotis sodalist*), the threatened bald eagle (*Haliaeetus leucocephalus*), the endangered pallid sturgeon (*Scaphirhynchus albus*), the endangered Illinois cave amphipod (*Gammarus acherondytes*), the threatened decurrent false aster (*Boltonia decurrens*), the threatened eastern prairie fringed orchid (*Platanthera leucophaea*), and the threatened Prairie bush clover (*Lespedza leptostachya*).

- The volume and types of wastes, for example wastes containing highly toxic constituents;

The Veolia facility incinerates a significant quantity of hazardous waste. According to its permit application, the Veolia facility has estimated that it incinerates approximately 14,050,000 tons of listed hazardous waste per year.

- Adequacy of any previously conducted risk assessment, given any subsequent changes in conditions likely to affect risk; and

As is discussed in more detail throughout this report, this risk screening revises the analysis made in the original 2003 risk screening. The earlier analysis did not consider potentially elevated levels of lead in the vicinity of the Veolia facility; nor did it consider the potential effects from mercury on subsistence fishers at the nearby Frank Holten State Park. In addition, the previous analysis did not consider the application of the HWC-MACT Rule emission standards.

D. Components of the Site-Specific Risk Assessment Process

The foundation for the risk screening methods described in this report is consistent with well-established chemical risk assessment principles and procedures developed for the regulation of environmental contaminants. Application of these guidelines and principles provides a consistent process for evaluating and documenting potential health risks associated with environmental exposures. The risk assessment process used by federal regulatory agencies and applied in this screening is essentially that described by the National Research Council [1], and consists of the following four components:

- Hazard identification, in which the chemical substances of concern in emissions from the facility are identified and data relevant to the toxic properties of these substances are compiled, reviewed, and evaluated;
- Dose-response evaluation, in which the relationship between dose and response is evaluated for each chemical of potential concern to derive toxicity values that can be used to estimate the incidence of adverse effects occurring at different exposure levels;
- Exposure assessment, in which potential exposure pathways are identified and measures of chemical exposure (e.g., concentrations for the various environmental media, or doses) are estimated for the potential exposure pathways, based upon various exposure assumptions and the characteristics of the population receiving the exposure; and,
- Risk characterization, in which numerical estimates of risk are calculated for each substance by each potential route of exposure using the toxicity information and the exposure estimates.

E. Methodology Used for This Evaluation

(1) Risk assessment guidance and software computation model

The general model for the risk assessment analysis is contained in the U.S. EPA *Final Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*; *EPA520-R-05-006* ("2005 combustion risk guidance"). U.S. EPA chose this model for this risk screening because it is peer-reviewed and incorporates an opportunity to use site-specific data. The 2005 combustion risk guidance outlines a comprehensive procedure for calculating estimated environmental media (e.g., air, soil, vegetables, fish, meat) concentrations, human intake rates, and health risks due to the emission of chemicals from combustion stacks. The basic steps in running the model for a facility may be summarized as follows:

a) Identify the chemicals of concern from stack emissions and assign emission rates;

b) Collect facility-specific stack data (e.g., stack height, gas exit velocity, building dimensions) and local meteorological data; use this data as inputs for the U.S. EPA's Industrial Source Complex Short Term ("ISCST3") air dispersion/deposition model;

c) Collect data on local land use (residential locations, agricultural locations, major water bodies) and map this data in reference to facility location;

d) Combine chemical-specific emission rates with the air dispersion model to calculate chemical-specific air concentrations and deposition rates for multiple receptor points around the facility;

e) Combine air concentrations and deposition rates with fate and transport algorithms to calculate chemical concentrations in environmental media (soils, plants, vegetable crops, livestock and fish);

f) Combine human intake rates for environmental media (air, soil, plants, vegetable crops, etc.) with estimated chemical concentrations in environmental media to determine chemical doses (i.e., intake per unit time) for each applicable exposure pathway;

g) Combine the chemical doses with chemical-specific toxicity factors (e.g., cancer slope factors, Reference Doses) to calculate a Cancer Risk for potentially carcinogenic chemicals and a Hazard Quotient for potentially toxic chemicals;

h) Sum the Cancer Risks and Hazard Quotients for each chemical across the applicable exposure pathways;

i) Sum the Cancer Risks and Hazard Quotients ("HQ") for each chemical to obtain the total Cancer Risks and Hazard Index ("HI", the sum of the HQs) for all chemicals.

Because the evaluation of multiple chemicals, multiple exposure pathways, and multiple fate and transport processes is a very challenging computational exercise, a computer software program was utilized to accomplish running the risk assessment model for each emission point/stack. For this project, the software system called *Industrial Risk Assessment Protocol - Human Health* (IRAP-h View™) was used. This software package (abbreviated as "IRAP" in this report) was developed by Lakes Environmental Software (Waterloo, Ontario, Canada). IRAP Version 3.0 is a Microsoft Windows application expressly designed to follow closely the recommendations, chemical-specific parameters, and fate and transport algorithms given in the U.S. EPA's 2005 combustion guidance. More information on this model can be obtained at the web site: <http://www.weblakes.com/iraph.html>

The U.S. EPA does not endorse the use of the IRAP software, but recognizes that the developers of IRAP made an effort to design a program which would closely follow the recommendations of the 2005 combustion guidance.

The major features of the IRAP system are its ability to: a) guide the user through the step-by-step process recommended in the 2005 combustion guidance; b) simultaneously calculate risk values (cancer risks and hazard quotients) for multiple chemicals emitted from a single source or from multiple sources at multiple locations; c) eliminate the need to perform hand calculations and write multiple interconnected computation spreadsheets; d) import air dispersion plot files containing the output from the Industrial Source Complex Dispersion Model ("ISCST3") air dispersion/deposition model runs; e) provide a graphical display of the air dispersion model receptor grid mode locations; f) directly import Geographic Information System ("GIS") generated land use/land cover data (e.g., residential, farming, and water body locations); g) define the perimeter of water bodies and water sheds using a polygon drawing tool; and h) define an area of concern by selecting the receptor grid nodes that represent the highest modeled air dispersion model values.

Attached to this report are listings which summarize non-default assumptions which U.S. EPA Region 5 set in the IRAP model for this revised screening. Default assumptions incorporated in the model are as detailed in the 2005 U.S. EPA document *Final Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*, which is available at: <http://www.epa.gov/epaoswer/hazwaste/combust/risk.htm> .

(2) Major site-specific exposure model assumptions

The following is a summary of the key exposure modeling assumptions employed in the analysis:

a) Exposed receptor - the individuals who could be exposed to contaminants were assumed to be local adults and children who could reside near the Veolia facility. An adult is assumed to be a person of at least 18 years of age who, by definition, could be exposed to contaminants for an Exposure Duration of 30 years. A child is a person up to age 7, who could be exposed to contaminants for an Exposure Duration of 6 years. The other required exposure factors for adults and children were taken from the 2005 combustion risk guidance.

b) Receptor locations - the individuals potentially exposed to contaminants were assumed to reside in the nearest area outside the Veolia facility boundary which is zoned commercial/residential. For emissions from each stack (i.e., Unit 2, Unit 3, and Unit 4), the ISCST3 air dispersion model and the IRAP Model were used to identify the locations predicted to correspond to the highest combination of air concentration and deposition from each stack. These locations were found to lie in a commercial use zone that is not currently a residential area. Contaminant impacts in actual residential areas are predicted to be lower than those used in this risk screening. This procedure adds conservatism to the risk screening.

c) Exposure pathways - the potentially exposed individuals were assumed to have contaminant intake from a combination of pathways. These can be summarized as: inhalation of contaminants as vapors and particles; incidental soil ingestion; and consumption of home grown garden vegetable produce. Each of these exposure pathways was modeled as occurring at the highest impact points described in section b) above. In addition, each individual was assumed to ingest fish harvested from the lakes at Frank Holten State Park. These individuals were assumed to be "subsistence" fishers. Subsistence fishers are "high-end" fish consumers who obtain a significant portion of their protein intake through fish consumption. This assumption provides a conservative estimate of fish consumption that would not likely underestimate contaminant exposure for the majority of persons living in the vicinity of Veolia. These exposure pathway scenarios and the required intake parameters are explained in detail in the 2005 combustion risk guidance.

II. Findings of this Risk Screening

A. *Dioxins*

In an earlier analysis of emissions from Veolia, the U.S. EPA used the IRAP software to evaluate potential risks from emissions of Dioxins from all three operating units at the Veolia Sauget facility. Using Dioxin emission data from facility stack testing performed in November 2002, preliminary calculations showed that the incremental increase in cancer risks would be well below the action level of 1.0E-5 (1 in 100,000) which is described in U.S. EPA's *Implementation of Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities* [2].

This revised analysis takes a different approach from the original 2003 risk screening because the HWC-MACT Rule emission limits have since become applicable to the Veolia facility have changed since the 2002 preliminary calculations, this revised analysis has taken a different approach as described below.

The air dispersion modeling, fate and transport in the environment, and estimation of cancer risk and toxic hazard are now based on the Dioxin emission rate corresponding to the respective HWC-MACT Rule allowable emission limit. Under this approach, if an unacceptable cancer risk and/or toxic hazard were predicted for Dioxin emitted at the HWC-MACT Rule limit, then site-specific RCRA permit limits and monitoring requirements to control emissions would be recommended.

The HWC-MACT Rule Dioxin emission limit for existing hazardous waste incinerators is given as a concentration in the stack gas: "emissions in excess of 0.20 ng TEQ/dscm corrected to 7 percent oxygen" (40 CFR §63.1203(a)(1)(I)). TEQ means the international method of expressing toxic equivalents for mixtures of dioxin and furan congeners as defined in "U.S. EPA, Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-dioxins and -dibenzofurans (CCDs and CDFs) and 1989 Update (March 1989)". Dioxin-TEQ is based on 2,3,7,8 - TCDD, which is the most toxic congener of the Dioxin group.

At the Veolia facility, the above stack gas concentration would be expected to result in emission rates at or below the following levels (see calculations in Attachment A):

Dioxin-TEQ:

Unit 2 = 3.60E-10 g/sec (1.30E-06 g/hr)
Unit 3 = 3.52E-10 g/sec (1.27E-06 g/hr)
Unit 4 = 9.84E-10 g/sec (3.54E-06 g/hr)

The predicted risk results for a local resident (who also consumes fish from Holten Lake) are presented below in Table 2. Because these risk results for Dioxin-TEQ are well below the action level of 1.0E-5 (1 in 100,000), the U.S. EPA is not recommending that any further reductions in Dioxin emissions should be required through a site-specific RCRA permit limit.

B. Toxic/ Carcinogenic Metals

The HWC-MACT Rule regulates emission concentrations of the metals arsenic, beryllium, chromium, lead, cadmium, and mercury because of the Agency's findings, as discussed in the preamble of that rule, that these metals present a greater potential threat than others generally emitted from a hazardous waste incinerator. The preamble further concludes that emissions of the other toxic and carcinogenic metals will be adequately restricted via the particulate emission limit contained in the Rule because almost all toxic and carcinogenic metals would be emitted as solid particulate matter. Therefore, a limit on particulate matter will serve as an overriding limit on the total emission of all other metals. However, because the HWC-MACT Rule specifically considers arsenic, beryllium, chromium, lead, cadmium, and mercury to be a potentially greater threat, we have included them in this risk screening.

In U.S. EPA's *Implementation of Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities* [2], the U.S. EPA recommends that results of risk assessments conducted for hazardous waste incinerators should be compared to a maximum cancer risk incremental increase target value (from metals at full permitted emission rates) of 1 in 100,000 (1.0 E-5). That same criterion is being used in this screening. In addition, risk assessments for hazardous waste incinerators have also typically calculated a hazard quotient ("HQ") from each metal and compared the results to the number 0.25. That criterion was also used in this risk screening. These combined criteria (for cancer risk and hazard quotient) are used here as indicators of whether or not human health is adequately protected, based on historical health risk benchmarks typically recommended by the U.S. EPA.

(1) *Lead*

The potential health impact of exposure to emissions of the metal lead is analyzed under a different approach than other metals. This approach predicts whether there are potential increases in blood lead level in a subgroup of the population (i.e., children) expected to have an enhanced sensitivity to lead exposure. The child blood lead level can be compared with a level known to be associated with protection from adverse developmental neurological effects of lead exposure.

The original analysis of the human health risk was described in the report: "Risk Screening for Onyx Incineration Facility; Sauget, Illinois" (September 23, 2003). In the time since the original analysis was completed, public comments received on the draft permit renewal indicated a concern about the health protectiveness of the draft permit renewal conditions. In particular, public comments raised the concern that: a) the current background level of lead in soil is already elevated because of past and current industrial activity in and around Sauget, and b) future emissions of lead from Veolia would add to a background of lead that is unacceptable.

Consequently, the EPA-Region 5 performed a re-evaluation of potential lead emissions from Veolia and developed an alternate approach to determine a recommended risk-based lead emission limit. The approach takes into account the concerns raised in public comments about potential background exposure to lead in Sauget and East St. Louis.

Part A: Development of a limit for soil deposition of lead from Veolia emissions

For hazardous waste cleanup sites and other situations where exposure to lead in soil could be encountered, the stated goal of the Agency is to: "... attempt to limit exposure to soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% exceeding the 10 μg lead/dl blood lead level. This 10 μg/dl blood lead level is based upon analyses conducted by the Centers for Disease Control and EPA that associate blood lead levels of 10 μg/dl and higher with health effects in children; however, this blood lead level is below a level that would trigger medical intervention." [3-4]. This strategy is usually employed as part of determining a soil remediation goal for lead at hazardous waste sites (e.g., Superfund, RCRA, Brownfields). This benchmark can also be used to determine an allowable limit for long-term deposition of lead onto soil in the vicinity of a lead-emitting combustion unit or other lead-emitting source. The EPA's Office of Solid Waste (OSW) has recommended that a long-term soil lead deposition limit of 100 mg/kg (100 ppm) should be adopted as a generic limit for any RCRA combustion unit [2]. This does not preclude the possibility that site-specific conditions would warrant that a lower deposition limit should be adopted.

In order to predict the mean blood lead level that would be expected in children in the 6 month to 7 year age range from exposure to a particular soil lead level, the Agency employs its uptake-biokinetic model (IEUBK [5]). In addition to lead exposure from soil, the model accounts for lead exposure from typical background sources including house dust, ambient air, water, and diet[2].

For the case of Veolia and the nearby town of Sauget, EPA-Region 5 does not have specific data on current soil lead levels and blood lead levels in children. But Region 5 does have some data on surface soil lead levels and child blood lead levels in East St. Louis, IL. In addition, Region 5 has found studies on soil lead levels in Flint, MI and Rochester, NY and a study of lead in house

[2] There can potentially be certain unpredictable sources of high lead intake, such as ingestion of paint chips, which currently cannot be included in the model. In situations where lead paint ingestion is suspected of contributing to elevated blood lead levels in children, additional intervention strategies need to be implemented. Outreach on this issue is already in place for this geographic area (See http://www.epa.gov/region5/gateway/leadcollab.htm). The focus of the model used in this risk screening is on impacts from the hazardous waste incinerator and its potential contribution to existing air and soil components of exposure.

dust in Rochester, NY. These studies are useful for developing some surrogate "background" media levels of lead that would need to be entered into the IEUBK model to apply to the Veolia case.

For East St. Louis, the U.S. EPA has generated a color-coded map that displays locations of measured soil lead concentrations expressed as ranges [6]. Although there does not appear to be an actual statistical summary of the data, the majority of surface soil lead levels were reported in the range of 74-399 mg/kg. Consequently, 400 mg/kg (400 ppm) was selected as the surrogate background or pre-existing soil lead concentration for East St. Louis and for the nearby town of Sauget, IL.

In addition, Region 5 has issued fact sheets describing three Superfund soil remediation projects conducted recently in East St. Louis [7-8]. Sampling of lead in residential soils around the three abandoned industrial facilities indicated that several residential lots had surface soil lead levels in excess of the EPA/Superfund action level of 400 mg/kg. Contaminated soil in the lots was removed and back filled with clean soil. There are apparently at least 20 former industrial properties in East St. Louis that have been identified as lead problem sites and could be subject to soil removal projects. Since the sites have been identified as a problem for lead, the soil concentrations likely exceed the EPA/Superfund action level of 400 mg/kg. This is taken as further evidence that selection of 400 mg/kg as an average soil lead background level is justified for East St. Louis and nearby Sauget. (The value of 400 ppm is two times (x2) higher than the default IEUBK recommendation for lead in soil at locations where no site-specific data is available. The value of 400 ppm also appears to be in the range of the majority of surface soil lead measurements reported in the historically industrial cities of Flint, MI and Rochester, NY.)

For house dust, EPA has performed a statistical analysis of lead in house dust from a rather large study on housing in Rochester, NY [9]. Indoor dust samples were analyzed from approximately 200 homes, most of which were constructed before 1950. Hence the dust data are representative of older housing where elevated dust lead levels might be expected from the deterioration of lead-based paints. From the combined data, the 50th percentile value for the dust lead distribution was found to be approximately 250 mg/kg (250 ppm). This value was adopted for the Veolia case. (The value of 250 ppm is 25% higher than the default IEUBK recommendation for lead in house dust for locations where no site-specific data is available.)

For the other necessary background inputs for lead in the Veolia case (i.e., ambient air, water, food/diet), the default values from the IEUBK model were selected.[3] These default values are generally conservative and do not have a large impact on the results of the IEUBK model.

[3] It should be noted that the IEUBK Model employs average or typical inhalation and ingestion rates for environmental media (i.e., air, soil, dust, water, food) based on national data on childhood intake behavior. It does not employ high-end or "pica" intake rates to skew the predicted geometric group mean blood lead level to a high-end value.

Based on the above discussion of lead input values, the IEUBK model was run to predict the mean blood lead level (in micrograms per deciliter µg/dL) and probability (%) of exceeding the target blood lead level of 10 µg/dL for several scenarios. The scenarios were selected to represent the potential impact of lead emissions from Veolia on surface soil lead concentrations in the vicinity of Veolia.

IEUBK Model runs for scenarios representing lead emissions from Veolia

Scenario 1: Veolia lead emission causes incremental increase in soil lead of 100 ppm (equivalent to 100% of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 100 ppm (incremental increase)
Dust level = 250 ppm (background) + 70 ppm (incremental increase from soil)

Geometric Mean blood lead level = 5.7 µg/dL
Predicted probability of children above target = 10.6 %

Scenario 2: Veolia lead emission causes incremental increase in soil lead of 50 ppm (equivalent to 50% of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 50 ppm (incremental increase)
Dust level = 250 ppm (background) + 35 ppm (incremental increase from soil)

Geometric Mean blood lead level = 5.3 µg/dL
Predicted probability of children above target = 8.2 %

Scenario 3: Veolia lead emission causes incremental increase in soil lead of 20 ppm (equivalent to 20% of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 20 ppm (incremental increase)
Dust level = 250 ppm (background) + 14 ppm (incremental increase from soil)

Geometric Mean blood lead level = 5.0 µg/dL
Predicted probability of children above target = 6.8 %

Scenario 4: Veolia lead emission causes incremental increase in soil lead of 15 ppm (equivalent to 15% of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 15 ppm (incremental increase)
Dust level = 250 ppm (background) + 11 ppm (incremental increase from soil)

Geometric Mean blood lead level = 5.0 µg/dL
Predicted probability of children above target = 6.4 %

Scenario 5: Veolia lead emission causes incremental increase in soil lead of 10 ppm (equivalent to 10% of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 10 ppm (incremental increase)
Dust level = 250 ppm (background) + 7 ppm (incremental increase from soil)

Geometric Mean blood lead level = 5.0 µg/dL
Predicted probability of children above target = 6.4 %

Scenario 6: Veolia lead emission causes incremental increase in soil lead of 5 ppm (equivalent to 5% of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 5 ppm (incremental increase)
Dust level = 250 ppm (background) + 4 ppm (incremental increase from soil)

Geometric Mean blood lead level = 4.9 µg/dL
Predicted probability of children above target = 6.0 %

Scenario 7: Veolia lead emission causes incremental increase in soil lead of 2.5 ppm (equivalent to 2.5 % of recommended limit in OSW risk management guidelines)

Soil level = 400 ppm (background) + 2.5 ppm (incremental increase)
Dust level = 250 ppm (background) + 2 ppm (incremental increase from soil)

Geometric Mean blood lead level = 4.9 µg/dL
Predicted probability of children above target = 6.0 %

The results from the Model runs indicate that allowing an incremental lead emission impact equivalent to the OSW recommended limit (i.e., 100 ppm) would be unacceptable since the number of children in a given population predicted to exceed the target blood lead goal is more than double the desired limit level (i.e., 10.6 % vs. 5.0 %).

Additional Model runs were performed to illustrate the effect of reducing the allowable incremental lead emission impact. The results indicate that the predicted geometric mean blood level and the population predicted to exceed the target blood lead goal continue to fall until an incremental soil lead increase of 5 ppm (5 mg/kg) is reached. Below 5 ppm, no significant further reductions are observed. (The model runs showed that potential risk would be below the desired target level of no more than 5% of children predicted to have a blood lead level of 10 µg/dL, even with site-specifically selected input parameters for the soil lead and dust lead background levels.) It should be pointed out that although the model used 400 ppm as the value for lead in the local soil, the actual mean soil lead level is expected to be below this value across the East St. Louis geographic area. There are several lines of evidence to support this expectation: a) Based on U.S. EPA's sampling surveys for lead in the East St. Louis area, it appears that the majority of surface soil lead levels were reported in the range of 74-399 mg/kg; b) in a report on background levels of inorganic constituents in soil across all major metropolitan counties in Illinois, the Illinois EPA reported a mean surface soil lead concentration of 71 mg/kg [10]; and c) the Illinois EPA and U.S. EPA have been taking action to reduce lead levels in those areas where high soil lead levels were found to exist. (See references 6, 7 and 8 for more information on these studies and activities.)

Consequently, the resulting recommendation is that a total long-term incremental increase in soil lead of 5 ppm should be used as the limit for the allowable increase in soil lead from the operation of the Veolia combustion units. This limit on soil deposition of lead should not be exceeded at any residential location in the vicinity of Veolia. This value is 5% (1/20th) of the original value that was used for back calculating a recommended lead emission limit in the Region 5 draft risk screening assessment from April 2003.

Additional data from these lead model runs are available in Attachment B.

Part B. Comparison of lead deposition predicted from HWC-MACT stack emissions to the lead deposition limit based on risk assessment

The analysis in Part A derived a risk-based limit for the total incremental increase in soil lead that should be allowable from operation of the Veolia combustion units. The second step in the analysis is to assign or derive a stack emission rate to demonstrate that the risk-based limit of 5 ppm (5 mg/kg) for the long-term deposition of lead in soil will not be exceeded.

The Veolia facility will be required to comply with the HWC-MACT emission standards, which include a stack concentration limit for semi-volatile metals. The HWC-MACT standard limit for semi-volatile metals is 240 $\mu g/m^3$. The HWC-MACT regulations use lead and cadmium as the surrogate metals for demonstrating compliance with the concentration limit for semi-volatile metals. Compliance with the HWC-MACT limit on semi-volatile metals is achieved by ensuring that the concentration of lead plus cadmium does not exceed the limit of 240 $\mu g/m^3$.

The procedure employed for this analysis may be summarized as follows:

1. The HWC-MACT concentration limit for semi-volatile metals was assigned as the starting point in the analysis. Semi-volatile metals under MACT include lead and cadmium. In order to avoid a possible underestimate of the lead concentration under the HWC-MACT limits, it was assumed for this calculation that all of the semi-volatile metals contribution would be due to lead alone. This is a conservative assumption.

2. The HWC-MACT concentration limit of 240 $\mu g/m^3$ for lead was applied to each of the 3 Veolia combustion units under the assumption that all 3 units could be operated simultaneously. Then the documented stack parameter characteristics for the 3 combustion units were used to calculate the corresponding lead emission rate for each unit.[4]

3. Modeling of air dispersion and particle deposition from the 3 combustion units was performed according to the protocols in EPA's ISCST3 air dispersion model. The model uses site-specific input data on stack gas parameters, terrain elevation, wind speed, wind direction, and precipitation to derive air dispersion factors and particle deposition rates for chemical constituents in stack gas plumes.

4. The output data from the ISCST3 Model for particle deposition was combined with the stack emission rates for lead. The data are combined in a risk assessment model called IRAP (as described earlier in the Methodology Section). IRAP allows a user to incorporate maps of local land use data (e.g., residential, industrial, agricultural, park land) and to correlate or "overlay" the land use data with the output receptor locations from the ISCST3 Model. In this case, maps corresponding to the nearest residential locations in the vicinity of Veolia were overlaid with the ISCST3 receptor locations. IRAP then calculates an accumulated soil deposition concentration for lead based on the starting stack emission rates and the particle deposition rates predicted from the ISCST3 Model. As a further conservative assumption, the accumulated soil deposition concentration for lead was calculated on the assumption that Veolia would operate continuously for 30 years, even though the proposed permit or HWC-MACT approval might apply to a much shorter time.

[4] The primary stack parameter needed for the calculations is the stack gas flow rate. The operating and stack parameter characteristics for the 3 Veolia combustion units were obtained from the RCRA Part B permit application or other compliance documents submitted by Veolia to the Illinois EPA and/or the U.S. EPA.

5. The IRAP Model was used to estimate a 30-year lead deposition concentration due to lead emissions corresponding to the HWC-MACT concentration limit of 240 $\mu g/m^3$. To provide conservatism for the analysis, the lead deposition concentration was reported for the highest predicted impact point of lead deposition outside the Veolia facility boundary as determined from the ISCST3 Model results. The predicted lead deposition due to each combustion unit and the combined totals are summarized below in Table 1, based on information presented in the Attachment B to this report:

Table 1 - Average and Maximum predicted increases in soil lead concentration due to 30 years of facility operation

	Average increase [a]	Maximum increase [b]
Veolia Combustion Unit	Concentration (mg/kg)	Concentration (mg/kg)
Stack #2	0.25	0.45
Stack #3	0.24	0.44
Stack #4	0.047	0.084
TOTAL:	0.54	0.97

a - average increase in lead concentration estimated during the 30-year operation period.
b - maximum increase estimated after the 30-year operation period is completed.

The highest increase in soil lead concentration due to long-term deposition of lead emissions from Veolia was predicted to occur at an off-site location outside the Veolia facility boundary. This location is currently zoned for industrial/commercial land use, and is a location not likely to be re-zoned for future residential land use. The predicted lead deposition amounts within current residential areas (Sauget, East St. Louis) in the vicinity of Veolia would be lower than the values shown above in Table 1.

The sum of deposition from all stacks was predicted to cause an increase in soil lead that would not exceed 1 mg/kg. Based on the use of standard EPA modeling protocols (i.e., ISCST3; IRAP) combined with a number of conservative assumptions about lead emissions, the predicted long-term increase in soil lead concentration for the highest impacted area outside of Veolia is lower than the recommended risk-based limit on soil lead concentration increase by a factor of at least 5 (i.e., 1 mg/kg vs. 5 mg/kg).

Consequently, the HWC-MACT Rule emission limit for semi-volatile metals as the permit-imposed concentration limit for lead appears to be the appropriate risk-based limit for lead emissions from the Veolia facility.

(1) Other Metals

The modeling methodology for metals and specific recommendations for metals emission limits are described below.

Modeling Methodology:

For all metals except lead (which is analyzed above), the analysis begins by calculating the potential cancer risk and potential HQ for each of the metals of concern for each of the three stacks (Unit 2, Unit 3, and Unit 4). The original risk screening conducted the modeling of metals emissions by calculating the cancer risks and hazard quotients associated with a unit emission rate of 1 gram per second. This revised analysis takes a different approach from the original 2003 risk screening because the HWC-MACT Rule emission limits have since become applicable to the Veolia facility.

Therefore, the air dispersion modeling, fate and transport in the environment, and estimation of cancer risk and toxic hazard are now based on the metals emission rate corresponding to the respective HWC-MACT Rule emission limit. Under this approach, if an unacceptable cancer risk or toxic hazard were predicted for a metal emitted at the HWC-MACT Rule limit, then site-specific RCRA permit limits and monitoring requirements to control emissions would be recommended.

The HWC-MACT Rule metals emission limits for existing hazardous waste incinerators at 40 CFR § 63.1203(a) are given as concentrations in the stack gas as follows:

> Semi volatile Metals - lead and cadmium (Pb and Cd): 240 μg/dscm, combined emissions, corrected to 7% oxygen.
>
> Low Volatility Metals - arsenic, beryllium, and chromium (As, Be and Cr+6): 97 μg/dscm, combined emissions, corrected to 7 percent oxygen.
>
> Mercury (Hg): 130 μg/dscm corrected to 7 percent oxygen.

At the Veolia facility, these stack gas concentrations would be expected to result in emissions at or below the following (see calculations in Attachment A):

Semi-volatile metals:

Unit 2 = 4.14E-04 g/sec (1.49 grams/hr)
Unit 3 = 4.05E-04 g/sec (1.46 grams/hr)
Unit 4 = 1.13E-03 g/sec (4.07 grams /hr

Low Volatility Metals:

Unit 2 = 1.66E-04 g/sec (0.597 grams/hr)
Unit 3 = 1.62E-04 g/sec (0.584 grams/hr)
Unit 4 = 4.53E-04 g/sec (1.63 grams/hr)

Mercury:

Unit 2 = 2.34E-04 g/sec (0.843 grams/hr)
Unit 3 = 2.29E-04 g/sec (0.825 grams/hr)
Unit 4 = 6.39E-04 g/sec (2.30 grams/hr)

Results from risk modeling of these emissions are presented below in Table 2, which provides cancer risk and toxic hazard indexes for each of the metals of concern, assuming each is emitted at the full HWC-MACT emission limit (e.g., Pb at 240 ug/m^3; Cd at 240 ug/m^3, etc.). The listed cancer risk and hazard index values account for the combination of possible exposure pathways to an Adult or Child receptor as described above in the Methodology section.

Table 2: Cancer Risk and Hazard estimates for all constituents and stack emission sources

Emission Source/ Contaminant	**Resident Child**		**Resident Adult**	
Stack 2:	**Cancer Risk**	**Hazard Quotient**	**Cancer Risk**	**Hazard Quotient**
Arsenic	2.99e-07	1.13e-02	7.53e-07	7.45e-03
Beryllium	3.05e-08	9.82e-03	1.53e-07	8.08e-03
Cadmium	5.71e-08	1.85e-02	2.86e-07	1.85e-02
Chromium (VI)	1.53e-07	1.65e-03	7.64e-07	1.29e-03
Mercuric chloride	NA	2.42e-02	NA	9.00e-03
Mercury	NA	8.71e-08	NA	8.70e-08
Methyl mercury	NA	3.57e-01	NA	5.04e-01
Dioxin – TEQ	1.75e-08	1.91e-03	3.42e-08	6.98e-04

Stack 3:	**Cancer Risk**	**Hazard Quotient**	**Cancer Risk**	**Hazard Quotient**
Arsenic	2.91e-07	1.11e-02	7.35e-07	7.27e-03
Beryllium	2.98e-08	9.58e-03	1.49e-07	7.89e-03
Cadmium	5.59e-08	1.81e-02	2.79e-07	1.81e-02
Chromium (VI)	1.49e-07	1.61e-03	7.45e-07	1.26e-03
Mercuric chloride	NA	2.35e-02	NA	8.71e-03
Mercury	NA	8.41e-08	NA	8.41e-08
Methyl mercury	NA	3.52e-01	NA	4.97e-01
Dioxin – TEQ	1.71e-08	1.87e-03	3.34e-08	6.83e-04
Stack 4:	**Cancer Risk**	**Hazard Quotient**	**Cancer Risk**	**Hazard Quotient**
Arsenic	6.31e-08	2.81e-03	1.79e-07	2.09e-03
Beryllium	1.00e-08	2.89e-03	5.02e-08	2.57e-03
Cadmium	1.88e-08	6.09e-03	9.40e-08	6.09e-03
Chromium (VI)	5.02e-08	4.57e-04	2.51e-07	3.92e-04
Mercuric chloride	NA	7.04e-03	NA	2.61e-03
Mercury	NA	2.61e-08	NA	2.61e-08
Methyl mercury	NA	8.72e-01	NA	1.24e+00
Dioxin – TEQ	5.33e-09	5.54e-04	2.06e-08	4.00e-04
NA - Not Applicable; available information not sufficient to classify contaminant as a carcinogen				

From the above Table, the following conclusions can be drawn:

Mercury

During the public comment period regarding the proposed permit renewal, a concern was raised that the original 2003 version of this risk screening did not consider the fact that significant subsistence fishing occurs at lakes located within the nearby Frank Holten State Park. The use of these lakes as a source of food was pointed out. In response, the revised screening has now considered this issue as well as the location and hydrology of the lakes. From the standpoint of risk assessment, mercury deposition and runoff to water bodies is a concern primarily because of the conversion of mercury to methylmercury within the water column. Methylmercury has a high potential for bioaccumulation and bioconcentration into aquatic species and fish. In addition, because new mercury emission limits became effective for the Veolia facility at the end of June 2004, this screening assessment now uses mercury emissions at the new MACT-imposed emission limit as its starting point.

The analysis of the potential impacts of lead emissions from the Veolia facility considers the potential for contaminated soil in the nearby residential areas. For other regulated toxic metals which are routinely evaluated in these assessments, resultant air concentrations do not specifically consider the actual numerical value for existing air concentrations, and the U.S. EPA's national guidance on conducting risk assessments for hazardous waste combustors currently does not incorporate this technique. However, risk management decisions which follow U.S. EPA recommendations (Reference [2]) typically consider the potential for cumulative emissions indirectly by: (1) assuming that other nearby sources of similar toxic metals contribute up to three times the amount of the facility being evaluated; and (2) for carcinogens, allowing the facility under investigation to only make an insignificant increase in potential cancer effects, so that even in the case of an accumulation of risks from many facilities, the facility under evaluation would only contribute an insignificant amount.

The U.S. EPA currently recommends [2] that when one is calculating an air concentration resulting from an emission source for toxic compounds such as a hazardous waste incinerator, one should not only compare this to a hazard index ("HI") value of 1.0 (i.e., the highest safe value), but, in addition, should compare the calculated air concentration to an HI value of 0.25 - to account for the fact that multiple facilities in the area might be emitting those same toxic compounds. This accounts for the fact that those emission might be additive. In this way, the facility being evaluated only contributes 25% or less to the maximum safe impact level. For each carcinogenic constituent evaluated, the predicted risk is compared to a 1 in 100,000 (0.00001 or 1.0E-05) target risk level for the allowable increase in cancer risk. Even if several facilities were contributing this same level of cancer risk, the total increase would not be expected to become significant for that geographical area. We believe this technique is protective and is a straightforward way to address the concern over additive emissions.

IV. Conclusions

U.S. EPA Region 5 conducted a screening human health risk assessment for the Veolia facility in Sauget, Illinois. Potential risks were calculated based on contaminant emissions at the existing regulatory limits for stack emissions of toxic/carcinogenic metals, which have also become compliance limits for the Veolia facility. In comparison to the frequently recommended risk management benchmarks of HI = 0.25 and Risk = 1.0 E-5 for each pollutant, the following recommendations are made with respect to further emission limits beyond the HWC-MACT metals concentration limits:

- Dioxins: No additional limits necessary
- Mercury: Restrict total annual stack emissions such that total HI is equal to or less than 0.25
- Cadmium: No additional limits necessary
- Lead: No additional limits necessary
- Chromium: No additional limits necessary
- Beryllium: No additional limits necessary
- Arsenic: No additional limits necessary

V. References:

[1] National Research Council (1983); *Risk Assessment in the Federal Government: Managing the Process*; January1983. National Academy Press, ISBN: 0309033497 (available at www.netstoreusa.com/mnbooks/o3o/0309033497.shtm)

[2] U.S. EPA (1994). *Implementation of Exposure Assessment Guidance for RCRA Hazardous Waste Combustion Facilities; Implementation Guidance for Conducting Indirect Exposure Analysis at RCRA Combustion Units* (Memorandum from Michael H. Shapiro, Director of U.S. EPA Office of Solid Waste to EPA Regional Waste Management Directors); April 1994.

[3] U.S. EPA (1994). *Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (OSWER Directive 9355.4-12; Office of Solid Waste and Emergency Response; Washington, DC; July 1994)

[4] U.S. EPA (1998). *Clarification to the 1994 Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (Office of Solid Waste and Emergency Response; Washington, DC; August 1998)

[5] U.S. EPA (2001). *User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows® version* (EPA OSWER Directive 9285.7-42; 16-bit version: October 2001; Office of Solid Waste and Emergency Response and Technical Review Work Group for Lead; Washington, DC)

[6] U.S. EPA (2002). *Metro East Lead Project: All Soil Lead Results* (sampling map generated by Tetra Tech EM, Inc. [St. Louis, MO] under contract to U.S. EPA; copy of map available in EPA Administrative Record for Veolia ES Technical Solutions facility)

[7] Illinois EPA (2003). *Cleanups Under State Response Action Program: East St. Louis Awning Company and Adept Tool; St. Clair County, East St. Louis.* (<http://www.epa.state.il.us/land/cleanup-programs/east-st-louis.html>)

[8] U.S. EPA (2002). *Fact Sheet: Cleanup Near Lilly Freeman Elementary School; East St. Louis, IL* (U.S. EPA - Region 5 Gateway Team; Chicago, IL; February 2002) (<http://www.epa.gov/region5/gateway/pdfs/freeman.pdf>)

[9] U.S. Department of Housing and Urban Development (HUD) (1995). *The relation of Lead-Contaminated House Dust and Blood Lead Levels Among Urban Children. Volumes I and II.* (Final Report to U.S. HUD from the University of Rochester School of Medicine, Rochester, NY and the National Center for Lead-Safe Housing; Columbia, MD; June 1995)

[10] Illinois EPA (1994). *A Summary of Selected Background Conditions for Inorganics in Soil* (IEPA/ENV/94-161); Office of Chemical Safety; Springfield, IL; August 1994.

ATTACHMENTS:

Attachment A: Calculation of constituent emission rates at the MACT emission limit for the Veolia Incineration Facility, Sauget, Illinois

Attachment B: Analysis of lead exposure health risk for lead emissions from the Veolia Incineration Facility; Sauget, Illinois

Attachment C: Technical Appendices to the Revised Risk Screening for Veolia Incineration Facility, Sauget, Illinois